Attachment E

SAVIAC
Shock and Vibration Information Analysis Center

Final Program

71st Shock and Vibration Symposium

NAVSEA CARDEROCK
Surface Warfare Center Division

ENIDINE
An IMC Company

November 6-9, 2000
Arlington, Virginia

Introduction

The Shock and Vibration Symposium is the oldest continuing meeting (since 1947) dealing with the specialized engineering problems and effects of dynamic environments on vehicles, structures, equipment, components, and humans. The Symposium was created as a mechanism for the exchange of information among Government agencies concerned with design, analysis, and testing. it provides a valuable opportunity for the technical community in Government, private industry, and academia to meet and discuss problems of mutual interest.
This year's Symposium is co-hosted by the Naval Surface Warfare Center/Carderock Division and Enidine Incorporated. These organizations are represented on the TAG by Ms. Fran Rasmussen and Ms. Mary Kerns respectively.

Program Committee Members

Co-Chair: Fran Rasmussen - NSWC/Carderock
Co-Chair: Mary Kerns - Enidine Incorporated
Mr. Edward Alexander - United Defense LP
Mr. Austin Alvarez - Electric Boat Corp.
Mr. Kevin Arden - Newport News Shipbuilding
Mr. Jeff Blankenship - NSWC/Coastal Systems Station
Dr. Richard Crowther - Ingalls Shipbuilding
Dr. Ray Daddazio - Weidlinger Associates, Inc.
Dr. Howard Gaberson - Naval Facilities Engineering Center
Dr. Michael Hale - Redstone Technical Test Center
Mr. Jack Halpin - MTS Systems Corporation
Mr. Dana Johansen - NAVSEA
Mr. Eric Kathe - US Army Benet Labs
Mr. Bob Krezel - NSWC/Carderock
Mr. Joel Leifer - SAVIAC/Booz · Allen & Hamilton
Mr. Michael Riley - NSWC/Carderock
Mr. David Smallwood - Sandia National Laboratories
Mr. William Yancey - Hi-Test Laboratories
Mr. David Watts - Air Force Research Laboratory
Dr. Charles R. Welch - USAE Research and Development Center
Mr. Dan Worth - NASA/Goddard

SAVIAC Director

Dr. Charles Robert Welch
USAE Research & Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180
(601) 634-3297
(601) 634-2747
saviac.wes.army.mil

SAVIAC Staff

Program Manager
Joel Leifer
(703) 289-5516
leifer_joel@bah.com

Assistant Program Manager
Nora Thompson
(703) 289-5135
thompson_nora@bah.com

SAVIAC/Booz·Allen & Hamilton
3190 Fairview Park Drive
Falls Church, VA 22042

Finance Manager
Marcy Birch
(703) 289-5133
birch_marcy@bah.com

Publications Manager
Tabatha Spitzer
(703) 289-5134
spitzer_tabatha@bah.com

Conferences Manager
Allison Knestrick
(703) 289-5479
knestrick_allison@bah.com

Schedule of Events

Hotel Tutorials: Monday, November 6, 2000 — **8:00 a.m. - 7:00 p.m.**

Sessions

Tuesday, November 7, 2000

Opening Session: **8:30-11:30 a.m.**

Track One (Unclassified)	*Track Two (Unclassified)*	*Track Three (Unclassified)*	*Track Four (Unclassified)*	*Track Five (Classified)*
Beyond Goodness of Fit Beyond Goodness of Fit Discussion Pyroshock Discussion Group	Facilities and Products Manufacturer's Panel	Human Response to Shock Impact & Blast Loading on Humans Panel SD2000 Discussion Group	Vibration I	NATO LWWAA LWWAA General Discussion

Wednesday Morning, November 8, 2000

UNDEX Testing Isolation I	COTS Panel	Data Analysis Data Analysis II	Numerical Methods I Numerical Methods II	Terrorist Threat Protection Blast

Wednesday Afternoon, November 8, 2000

Wednesday Night Social Event

Modeling and Simulation of Structures with Joint Interfaces Modeling and Simulation of Structures with Joint Interfaces Discussion	Standards	Terrorist Threat Protection		AMSS Isolation

Thursday Morning, November 9, 2000

Microgravity	Seismic Data Analysis Discussion Group	Blast	Gun Launch Environments	UNDEX Advanced Material System Bow Dome Shock Evaluation - Test and Analysis

Thursday Afternoon, November 9, 2000

Test Methods	Isolation II	UNDEX I UNDEX II		Hydrocode Simulation Session

Guest Program: Tuesday, A Special Look at Washington
Thursday, A Day in Middleburg, VA

Tour: Thursday, NSWC/Carderock, Buses leave at 12:15 from Hotel

2000 Supporting Organizations

SAVIAC would like to thank the following Government and commercial organizations for their financial support in 2000.

Air Force Research Laboratory, Munitions Directorate
Defense Threat Reduction Agency/Field Command
Naval Surface Warfare Center/Carderock
Naval Surface Warfare Center/Crane
Redstone Technical Test Center
Sandia National Laboratories
US Army Engineer Research & Development Center
Air Force Research Laboratory/Air Vehicles Directorate
Electric Boat Corporation
Weidlinger Associates, Inc.

SAVIAC also thanks the following organizations for helping to defray the cost of the Wednesday night social event, Stars and Stripes.

Electric Boat Corp.

Endevco

Instrumented Sensor Technology

PCB Piezotronics, Inc.

71st Shock and Vibration Sympsoium Exhibitors

Aberdeen Test Center	*HI-TEST Laboratories*	*NSWC/Carderock*
Dactron	*Instrumented Sensor Tech.*	*NSWC/Crane*
DSP Technology	*Kistler Instrument Corp.*	*PCB Piezotronics Inc.*
Dynamic Testing Inc.	*LMS N. America*	*Precision Filters, Inc.*
Eglin AFB/Ingalls Shipbuilding	*M&P International*	*Spectral Dynamics Inc.*
Electric Boat	*Microstar Laboratories Inc.*	*Taylor Devices Inc.*
Endevco	*MTS Systems Corp.*	*Vibration Research Corp.*
Enidine Incorporated	*Newport News Shipbuilding*	*Wilcoxin Research Inc.*

Please visit our exhibitors in the Potomac Room
Tuesday 11:30-5:00
Wednesday 7:30-5:00
Exhibitor's Luncheon 11:30-12:30 in the Potomac Room

71st Shock and Vibration Symposium
Final Program

Tutorials: Monday, November 6, 2000

Tutorial	Instructor	Room	Time
Overview of Underwater Shock and DDAM	Young Shin	Potomac I	8-11:00 a.m.
Introduction to Vibration Testing	Jon Wilson	Potomac II	8-11:00 a.m.
Substructure Coupling and Structural Modification for S&V	Joshua Gordis	Potomac III	8-11:00 a.m.
Wavelet Applications in Shock and Vibration	Dan Worth	Potomac IV	8-11:00 a.m.
Dynamic Testing: Transient and Steady State	Pete Stein	Potomac V	8-11:00 a.m.
The Measurement of Meaningful Shock & Vibration Data	Patrick Walter	Potomac II	12-3:00 p.m.
Data Acquisition for Shock & Vibration Measurements	Strether Smith	Potomac III	12-3:00 p.m.
Application of the USA Code to Underwater Shock Problems	John DeRuntz	Potomac IV	12-3:00 p.m.
Overview of Explosive Effects and Blast Resistant Design	Tom Carroll	Potomac VI	12-3:00 p.m.
Using Temporal Moments to Characterize Shock	Dave Smallwood	Potomac II	4-7:00 p.m.
Verification & Validation in Computational Mechanics	Bill Oberkampf	Potomac III	4-7:00 p.m.
Validation and Editing of Shock & Vibration Data	Allan Piersol	Potomac IV	4-7:00 p.m.
Empirical Mode Decomposition and Time-Frequency Analysis	Liming Salvino	Potomac VI	4-7:00 p.m..

Tuesday, November 7, 2000
Author/Chair Meeting, Regency A, 7:30 - 8:00 am

Opening Session	Regency Ballroom	8:30-11:30 a.m.

8:30 a.m. - Call to Order: *Joel Leifer*, SAVIAC Program Manager
8:35 a.m. - Welcome: *Captain Steven Petri*, NSWC/Carderock
8:45 a.m. - Welcome: *Patrick P. Lee*, Chairman, Enidine Incorporated
8:55 a.m. - Symposium Highlights: *Joel Leifer*, SAVIAC Program Manager
9:15 a.m. - Henry Pusey Award Presentation: *Mike Riley*, NSWC/Carderock, *Mary Kerns*, Enidine Incorporated
9:25 a.m. - Mel Baron Award: *Dr. Dan Inman*, Professor, Virginia Polytechnic & State University
9:35 a.m. - Life Time Achievement Award: *Robert McCarthy*, NAVSEA O5P
9:45 a.m. - Director's Remarks: *Dr. Charles Robert Welch*, USAE Research and Development Center
9:55 a.m. - Break
10:15 a.m. - Keynote Address: *RDML Charles Hamilton*, NAVSEA PEO Surface Strike
11:00 a.m. - Elias Klein Memorial Lecture: *Dr. John DeRuntz*, President USA; *"Music-The Art of Good Vibrations"*
11:30 a.m. - Break

Exhibitor's Luncheon, 11:30 - 1:00, Potomac Room

Track One

Beyond Goodness of Fit	Regency A	Chair: Timothy Hasselman, ACTA Inc.

User Friendly Error Measures - *Thomas Geers, University of Colorado*

1:00 ***The Use of Temporal Moments in Simulation and Validation Programs*** - *David Smallwood, Sandia National Laboratories*

1:20 ***A Comprehensive Multi-Point Data Analysis Methodology Using Spatial Response Patterns*** - *David Russell, Electric Boat Corporation*

1:40

Issues of Data Cleansing and Feature Extraction for Transient Dynamic Model Updating - *Hoon Sohn, Francois Hemez, and Amanda Wilson, Los Alamos National Laboratory*

2:00

On Going Efforts in Statistical Model Updating and Validation for Transient Structural Dynamics - *Scott Doebling, Francois Hemez, and Amanda Wilson, Los Alamos National Laboratory*

2:20

Modal Metrics for Model Test Correlation, Model Updating, and Total Uncertainty Quantification - *Tim Hasselman and Timothy Geers, ACTA Inc., Mark Anderson, Los Alamos National Laboratory*

2:40

Beyond Goodness of Fit Discussion Group 3:00-4:00 *Regency A* *Chair: Timothy Hasselman, ACTA, Inc.*

Pyroshock Discussion Group 4:30-5:30 *Regency A* *Chair: Vesta Bateman, SNL*

The Pyroshock Working Group will meet to discuss topics such as concepts of near-field, mid-field and far-field pyroshock, pyroshock specifications and instrumentation, and simulation of near-field, mid-field and far-field pyroshocks. Group members are encouraged to participate in a general discussion of recent experiences and problems in pyroshock testing.

Track Two

Facilities and Products *Regency B* *Chair: Thurston Brooks, Wilcoxon*

1:00 ***Underwater Shock Analysis on Windows NT*** - *Rick Coffman, Northrop Grumman Corporation*
1:10 ***15 Year Service Interval - New Isolator Technologies*** - *Tom Miller, Enidine Incorporated*
1:30 ***System Level Naval Isolation Approach*** - *Tom Miller, Enidine Incorporated*
1:50 ***Testing Capabilities*** - *Mike Latvis, Enidine Incorporated*
2:10 ***Virginia Class Submarine (SSN774) Linear Bixial Impact Machine (LBIM)*** - *Alfred Jagaczewski, Naval Undersea Warfare Center*
2:30 ***The Annapolis Shock and Vibration Test Facility*** - *Shawn McPartland, Engineering Technology Center*

Manufacturer's Panel 3:00-5:00 *Regency B* *Chair: John Wilson, The Dynamic Consultant*

Instrumentation manufacturers will present different aspects of shock and/or vibration measurement, control or analysis. Audience participation will be encouraged, allowing customers an opportunity to air their problems and possibly receive answers from knowledgeable technical representatives. Panel members include Rich Cadille, Kistler Instruments, Anthony Chu, Endevco, Jim Lally, PCB Piezotronics, Tony Keller, Spectral Dynamics, Bob Patera, Agilent Technologies, and Strether Smith, DSPCon.

Track Three

Human Response to Shock *Regency C* *Chair: Eric Luft, NSWC/Carderock*
Co-Chair: Phil Dudt, NSWC/Carderock

1:00 ***Optimal Isolation of Biodynamic Response to the Underwater Shock*** - *Zhi Zong, KY Lam, SC Ngiam, and Tessa Gan, Institute of High Performance Computing*
1:20 ***Study of MR Damper for Semi-Active Vibration Control of Human Powered Vehicle*** - *Guo Zhi Yao, Soon Liang Seow, Fook Fah Yap and Guang Chen, Nanyang Technological University*
1:40 ***Modeling and Simulation of Human Body Response to Ship Shock Motion*** - *Kin Chew Hung, Zhi Zong, and Khin Yong Lam, Institute of High Performance Computing*
2:00 ***Shock Response Attenuation of Human on Shipboard to Underwater Explosion*** - *Shi Wei Gong, Institute of High Performance Computing*

Impact and Blast Loading on Humans: Countermeasures, Injury Criteria, Use of Human Surrogates Panel *Regency C* 2:40-4:40 *Chair: Walter Pilkey, University of Virginia*

This panel will address the problem of injuries to humans due to blast and impact loading. Injury mechanisms are investigated using such surrogates as human cadavers, dummies, computer models of humans, and computer models of dummies. The use of cadavers to determine injury tolerance levels and to create better dummy and computer models will be discussed. Also of interest will be progress in the development of injury criteria and models. Countermeasures ranging from airbags to helmets and body armor will be considered. Panel Members are J. McEntier, US Army, D. Bergeron, Defense Research Establishment, C. D. Bass, University of Virginia, and Cmdr M. DeMaio, Armed Forces Institute of Pathology.

SD2000 Discussion Group *Regency C* 5:00-6:00 *Chair: Dan Inman, Virginia Tech*

In April of 1999, Los Alamos National Laboratories along with David Ewins of Imperial College and Dan Inman, held a week long workshop to help determine the way forward in structural dynamics. This discussion session will briefly review the outcome of the SD2000 Forum and then open the floor for similar discussions on how the SAVIAC community might add to thoughts on the way forward for the next 20 years.

Track Four

Vibration I	Regency D	Chair: Richard Crowther, Ingalls Shipbuilding

1:00 ***Simultaneous Health Monitoring and Control of Panels*** - *Daniel Inman, M. Ahmadian, and R.O. Claus, Center for Intelligent Material Systems and Structures*

1:20 ***Suppressing Plate Vibrations with Smart Materials*** - *Daniel Inman, Center for Intelligent Material Systems Structures*

1:40 ***Tuned Support Structure for Structure-Borne Noise Reduction of Inertial Navigator with Dithered Ring Laser Gyros (RLG)*** - *Jamil Lahham, Donald Wigent and Albert Coleman, Litton Marine Systems, Inc.*

2:00 ***Thermally Induced Vibrations of a Flexible Solar Array*** - *Xiang An, Northwest Polytechnical University*

2:40 ***Piezoresistance Stress Measurements with Strain Correction*** - *James Gran and Mark Groethe, SRI International*

3:00 ***Cavitation Swirl Pulsation in the Intake Pipe of Radial Pumps*** - *Andrej Predin and Ignacijo Bilus, Univerisity of Maribor Faculty of Mechanical Engineering, and Roman Klasinc, Graz Technology University*

3:20 ***Dynamic Stiffening of a Cantilever Circular Arch: Exact Solution*** - *Ekrem Tufekci, Instanbul Universiy*

Track Five (Classified)

NATO	NSWC/Carderock	Chair: Fred Fisch, NSWC/Carderock

1:00 ***Report on a Niag Pre-Feasibility Study on Naval Ship Design for Improved Fire Resistance*** - *Thomas Carroll, Center for Blast Resistant Design*

1:20 ***On TNO-PML Developments of Blast Resistant Structures for the Royal Netherlands Navy*** - *Leon Galle, Royal Netherlands Navy, and Andre van Erkel TNO-PML*

LWWAA	NSWC/Carderock	Chair: Austin Alvarez, Electric Boat Corp. Co-Chair: Jamie Howell, NSWC/Carderock

3:00 ***Virginia Class LWWAA Outboard System Hybrid Shock Quantification Approach*** - *Austin Alvarez, Electric Boat Corporation*

3:20 ***Simplified Physics Based Analysis Methods for Bounding Shock Response*** - *Gale Mulligan and Christopher Abate, Electric Boat Corporation*

3:40 ***A/B-1 Correlation/Bounding Analysis*** - *Steve Ollhoff and Earnest Shen, Electric Boat Corporation*

4:00 ***Underwater Shock Analysis of the VIRGINIA Class Light Weight Wide Aperture Array (LWWAA) System*** - *Thomas Walther, Electric Boat Corporation*

4:20 ***Bounding Approach to Estimating and Evaluating Composite Damage Potential of the Light Weight Wide Aperture Ray (LWWAA)*** - *Thomas Walther, Electric Boat Corporation*

4:40 ***LWWAA Shock Qualification and Lessons Learned and R&D Needs*** - *Austin Alvarez, Electric Boat Corporation*

General Discussion of Technologies to Enable Composites for Future Underwater Shock Applications	NSWC/Carderock Chair: Andrew Miles, NAVSEA 05P3	5:20 -6:00

Wednesday Morning, November 8, 2000

Author/Chair Meeting, Regency A, 7:30 - 8:00 am

Track One

UNDEX Testing	Regency A	Chair: Joseph Venne, NSWC/Carderock

8:00 ***UNDEX Testing of a Submerged Pressure Hull, Simulation, and Measurement*** - *Jan Stevall, Kockums AFB*

8:20 ***Shipboard Modular Arrangement Reconfiguration Technology (SMART) Foundation*** - *J.P. Christein, Newport News Shipbuilding*

9:00 ***Test and Analysis of Shock and Bubble Loading and Target Response from Close-Proximity Underwater Explosions*** - *John Slater, Gerry Rude, Defense Research Establishment Suffield, Paul Thibault, Combustion Dynamics Ltd., and Merv Norwood, Martec Ltd.*

Isolation I — Regency A — Chair: Doug Taylor, Taylor Devices

10:00 ***A Numerical Investigation of Combined Shock and Vibration Isolation through the Semi-Active Control of a Magnetorheological Fluid Damper in Parallel with an Air Spring*** - *Troy Tanner, Newport News Shipbuilding, and Michael Mosher, Taylor Devices, Inc.*

10:20 ***Developing a Functional Representation of an Isolation Mount from Parsing Data*** - *Troy Tanner, Newport News Shipbuilding*

10:40 ***Aluminum Honeycomb Characteristics in Dynamic Crush Environments*** - *Vesta Bateman, Fred Brown, Michael Nusser, and Lloyd Swanson, Sandia National Laboratories*

11:00 ***Double Acting Mechanical Shock Isolator (DAMSI)*** - *Dan Radice, Enidine, Incorporated*

Track Two

COTS Panel — Regency B — 10:00-12:00 — Chair: Mary Kerns, Enidine Incorporated

The concept of utilizing commercial, off the shelf, electronics and equipment has created the need for a re-evaluation of the analytical foundation utilized to characterize shock. What are the implications, and what do we need to do as a community to spearhead this change. Dana Johansen - NAVSEA, William Gottwald - NSWCCD, Fred Costanzo - UERD, Rick Griffen - Newport News Shipbuilding, Rick Dugan - Electric Boat, Ray Daddazzio - Weidlinger Associates, Steve Schechter, Raytheon, Jaime

Track Three

Data Analysis I — Regency C — Chair: David Smallwood, Sandia National Laboratories

8:00 ***Evaluating Vibration Environments Using the Shock Response Spectrum*** - *Allan Piersol, Piersol Engineering Company, and George Henderson, GHI Systems, Inc.*

8:20 ***A Practical Method for Acquiring Uncertainty Estimates for Test System Measurements*** - *Donald Chandler and Alex Specker, Precision Filters, Inc.*

8:40 ***Does High Reliability Equal Zero Defects?*** - *Alex Porter, Entela, Inc.*

9:00 ***The Analysis of Nonstationary Multiple Output Data*** - *Ronald Merritt, Naval Air Warfare Center Weapons Division*

9:20 ***Uncertainties of Shock Response Spectrum Measurements for Complex Shocks*** - *Andrey Smirnov, METRON Ltd. Research and Development Company*

Data Analysis II — Regency C — Chair: Ruby Delaune, Newport News Shipbuilding

10:00 ***The Synthesis of Structural Responses using Experimentally Measured Frequency Response Functions and Field Test Data*** - *Jerome Cap and Curtis Nelson, Sandia National Laboratories*

10:20 ***Representation of Random Shock via the Karhunen Loeve Expansion*** - *Thomas Paez, Sandia National Laboratories, and Norman Hunter, Los Alamos National Laboratory*

10:40 ***Methods for Approximating and Extracting Rigid Body Motions from Test and Simulation*** - *Joseph Wright and Raymond Dadazzio, Weidlinger Associates*

11:00 ***Shock Response Spectrum Calculation - Using Waveform Reconstruction to Improve the Results*** - *David Smallwood, Sandia National Laboratories*

11:20 ***Spacial Requirements for Linear Transducer Measurements and Excitation Point Mapping in Six-Degree-of-Freedom Vibration Testing*** - *Mike Hale, Redstone Technical Test Center and Norman Fitz-Coy, University of Florida*

Track Four

Numerical Methods I — Regency D — Chair: Ray Daddazio, Weidlinger Associates; Co-Chair: George Camp, Bath Iron Works

8:00 ***A Novel Finite Element Approach to Dynamic Analysis of Large Structures with Cyclic Symmetry Boundary Conditions*** - *Joseph Amorosi, Adapco*

8:20 ***Use of Wavelet Denoising for Analysis of Snubbing and Gap Opening/Closing Responses of Certain Mounts Installed on a Flexible Structure*** - *Ken Tomita, Jerry Spyche, Mary Kerns and Benjamine Houghton, Enidine, Incorporated*

8:40 ***Progressive Failure Simulation of Composite Laminates*** - *Gerard Vanderborck and Amine Hassim, Thomas Marconi Sonar*

9:00 ***Validation of Frequency Response Synthesis for Large-Scale Structural*** - *Joshua Gordis and Fotis Papoulias, Naval Postgraduate School, and Frank Leban, Naval Surface Warfare Center/Carderock*

Numerical Methods II — *Regency D* — *Chair: Ed Alexander, United Defense LP*

9:10 ***Progressive Failure of Composite Laminates*** *- Gerard Vanderborck and Amine Hassim, Thomas Marconi Sonar*
9:50 ***Multicontinuum Failure Analysis of Composite Hull Structures under Shock Wave Loading*** *- Jim Lua, Tom Littlewood, and Vince Godino, AT&T Engineering Technology Center/An Anteon Company, and Andrew Hansen, University of Wyoming/Department of Mechanical Engineering*
10:10 ***Investigation of Composite Marine Structures Subjected to Underwater Shock*** *- Shi Wei Gong and Khin Yong Lam, Institute of High Performance Computing*
10:30 ***Application to Shock Analysis of the Transformation of the Modal Damping Matrix to Physical Coordinates*** *- Troy Tanner, Newport News Shipbuilding*
10:50 ***Ballistic Shock Prediction Methodology for Crusader Vehicle Components*** *- Abraham Frydman and Dean Li, Army Research Laboratory*
11:10 ***Implementation of Modal Damping in a Direct Implicit Transient Solver*** *- Kenneth Alvin, Sandia National Laboratories*

Track Five (Classified)

Terrorist Threat Protection (Classified) — *NSWC/Carderock* — *Chair: Reed Mosher, ERDC*
Co-Chair: Robert Hall, ERDC

8:00 ***Methodologies for Predicting Post-Crack Behavior of Architectural Glazing Subjected to Explosive Airblast*** *- Steve Lofton and Thomas Slawson, US Army Engineer Research and Development Center*
8:20 ***Program for Developing Composite Wrap Retroprofits for Reinforced Concrete Columns*** *- Kenneth Morrill, L. Javier Malvar, and John Crawford, Karagozian and Case*
8:40 ***Wall Retroprofits for Close-in Car Bombs, Design and Test*** *- John Crawford, Anthony Ronca, Daniele Pelessone, and Brian Dunn, Karagozian and Case*
9:00 ***Measuring and Predicting the Response of Humans in a Typical Office Environment to Blast Loads*** *- David Bogosian, Karagozian & Case, and Hrire Der Avanessian, Biodynamic Engineering, Inc.*

Blast (Classified) — *NSWC/Carderock* — *Chair: Alan Ohrt, AFRL/MNAL*
Co-Chair: Tom Slawson, ERDC

9:40 ***Response of Hot-Rolled I-Beams to Conventional Weapons*** *- James Baylot, US Army Engineer Research and Development Center*
10:00 ***Correcting Transient Data Defects*** *- Russell Garner and David Bittle, US Army AMCOM RDEC*
10:20 ***Engineering Model for the Collapse of an Explosively Loaded Thick Plate*** *- Kent Goering, Applied Research Associates*
10:40 ***A Simplified Model of Airblast Propagation in Tunnels*** *- J.R. Britt, Science Applications International, Inc., C.E. Joachim and G.W. McMahon, U.S. Army Engineer Research and Development Center*
11:00 ***Comparisons of Airblast Pressure and Impulse Produced by High Explosive and Fuel-Air Explosive Detonations*** *- C.E. Joachim and G.W. McMahon, U.S. Army Engineer Research and Development Center*
11:20 ***Benchmark Experiments for Evaluation of Internal Airblast Models*** *- Alan Ohrt, AFRL/MNAL*

Wednesday Afternoon, November 8, 2000

Track One

Modeling and Simulation of Structures with Joint Interfaces — *Regency A* — *Chair: Jeffrey Dohner, SNL*

1:00 ***Damping Investigations of a Simplified Frictional Shear Joint*** *- David Smallwood, Danny Gregory, and Ronald Coleman, Sandia National Laboratories*
1:20 ***A Study of Frictional Velocity Effects on Structural Interfaces*** *- Bonnie Antoun, Sandia National Laboratories*
1:40 ***A Reduced Order, One Dimensional Model of Joint Response*** *- Jeffrey Dohner, Sandia National Laboratories*
2:00 ***IWAN Modeling of Mechanical Joints via Results from Contact Mechanics*** *- Daniel Segalman, Sandia National Laboratories*

Modeling and Simulation of Structures with Joint Interfaces Discussion — *Regency A* — *2:40 - 3:40* — *Chair: Jeffrey Dohner, SNL*

Track Two

Standards — *Regency B* — *Chair: Skip Connon, Aberdeen Test Center*

1:00 ***The Case for Tailoring MIL-S_901 and a Tailoring Test Case*** *- Andy Anderson and Kenneth Lussky, UDLP*
1:20 ***Ballistic Shock Simulation and Measurement*** *- Mike Clark, U.S. Army Aberdeen Test Center*
1:40 ***Tutorial on Ballistic Shock Fundamentals*** *- Scott Walton, US Army Aberdeen Test Center*
2:00 ***An Overview of a NATO Methodology for Evaluating the Ability of a Material to Meet Extended Life Requirements*** *- Randy Patrick, US Army Yuma Proving Ground*
2:20 ***An Example Using the Ten Step Method for Evaluating the Ability of a Material to Meet Extended Life Requirements*** *- Brian Haugen, Naval Air Warfare Center*
2:40 ***On the Adequacy of Sequentially Applied Uniaxial Vibration Testing*** *- Wayne Whiteman, US Army*

Track Three

Terrorist-Threat Protection — *Regency C* — *Chair: James Baylot, ERDC* — *Co-Chair: James O'Daniel, ERDC*

1:00 ***Scaled Building Responses Due to an Internal Detonation*** *- Paul Graham, and Vincent Chiarito, ERDC, and Craig Lemarche, DTRA*
1:20 ***Retrofits for Existing Windows*** *Windows to Protect Occupants from Injurious Debris Due to a Bombing - John Crawford, Anthony Ronca, Daniele Pelessone, and Brian Dunn, Karagozian and Case*
1:40 ***Reliability of Dam Systems Subjected to Underwater Shock Using Finite-Element High-Performance Fragility Analysis*** *- Luis de Bejar and Robert Hall, ERDC*
2:00 ***A Feasibility Study on Use of Phase Profilometry to Measure Dynamic Wall Deflections From Detonations*** *- Christo Lunderman, James Troupe, Charles Robert Welch, Barry McCleave, and Cary Cox, ERDC*

Track Five

Advanced Machinery Support System (AMSS) — *NSWC/Carderock* — *Chair: William Martin, NSWC/CD*

1:00 ***Overview of the Advanced Machinery Support Shock Demonstration*** *- William Martin, NSWC/Carderock*
1:20 ***Development of a Characterization for the DT227 Mount*** *- David Russell, General Dynamics, Electric Boat Corporation*
1:40 ***Advanced Machinery Support System (AMSS) Underwater Explosion Test Series*** *- William Gottwald III, NSWC/Carderock*
2:00 ***Evaluations of Structural Response and Damping Using Empirical Mode Time Frequency Analysis*** *- Liming Salvino, NSWC/Carderock*
2:20 ***Advanced Machinery Support System Underway Analysis*** *- Tom Littlewood, Jeff O'Brien, and Vincent Isgro, Engineering Technology Center*
2:40 ***Simulation of the Response of Particulate Filled Beams Due to Shock Excitation*** *- Raymond Daddazio, Mohammed Ettoruney, Ka Kin Chan, and Ivan Sander, Weidlinger Associates*

Isolation (Classified) — *NSWC/Carderock* — *Chair: Kevin Arden, Newport News Shipbuilding* — *Co-Chair: Allen Parkes, NSWC/Crane*

3:20 ***Taking Advantage of Material Non-Linearity to Prepare for COTS Insertion*** *- Josh Jackson, Newport News Shipbuilding*
3:40 ***Mitigation of Military High Shock Transients for Shipboard Inertial Navigator with Dithered Ring Laser Gyros (RLG)*** *- Jamil Lahham, Litton Marine Systems, Inc. and Michael Mosher, Taylor Devices, Inc.*
4:00 ***Shock Performance of a Semi-Active Isolation Device*** *- David Russell, Richard Dugan and Christopher Fornara, Electric Boat Corp.*
4:20 ***High-Impact Shock Capabilities for Characterizing Shock Mounts*** *- Kevin Gould, Newport News Shipbuilding*
4:40 ***Assist Threat-Based Study of Shock Isolation Mount Performance*** *- John Przybysz, Jr., and Roy Javier, NSWC/Carderock*

An IAC For The New Millenium — *Regency B* — *6:00 - 7:00* — *Chair: Charles Robert Welch, ERDC* — *Chair: Joel Leifer, SAVIAC*

SAVIAC has been around in one form or another since 1947, first as a Centralizing Activity and then as the Shock & Vibration Information Center (SVIC) under NRL and since 1990 as SAVIAC, a contractor operated activity under NSWC and ERDC. As the needs of the community changed over the years, some outlets were discontinued while new ones were added. Today, we have the Shock & Vibration Symposium, the Current Awareness Newsletter, the Shock & Vibration Journal, the Critical Technologies Journal, and the SAVIAC website as our distribution channels. As we approach the completion of the first year of the new millennium (depending on your viewpoint as to the start date) I ask you to think about what you need from SAVIAC. Please join us for a frank discussion on this topic to be followed by our networking social.

Wednesday Evening Social Event - Stars & Stripes, Potomac Room, 7:00 - 9:00 pm

Thursday Morning, November 9, 2000

Author/Chair Meeting, Regency A, 7:30 - 8:00 am

Track One

Microgravity — *Regency A* — *Chair: Christy Gattis, NASA/MSFC*

8:00 ***Fundamentals of Microgravity Vibration Isolation for the International Space Station*** - *Mark Whorton, NASA/MSFC*

8:20 ***G-Limit: A Vibration Isolation System for the Microgravity Science Glovebox*** - *Mark Whorton, NASA/MSFC*

8:40 ***Statistical Analysis Modeling for the International Space Station US Laboratory Module*** - *Wei-Joe Sun, Boeing International Space Station*

9:00 ***A System for Microgravity Measurements on the HST NCC Vibration Emittance Test*** - *Carl Voorhees, Lockheed Martin, Joel Sills and Brian Clapp, LMTO*

9:20 ***Vibraton Measurements for AMES Life Sciences Facilities and Equipment*** - *Martin Hasha, Lockheed Martin Technology Services*

9:40 ***Microgravity Disturbance Characterization of the Quench Module Insert (QMI) Phase Change Device (PCD)*** - *Christy Gattis, NASA/MSFC*

Track Two

Seismic — *Regency B* — *Chair: Carl Larsen, MTS Corp.*

8:00 ***A Method for Calculating the Seismic Effect in Rock Slope*** - *Yun-long He, Wuhan University of Hydraulic & Electric Engineering*

8:20 ***Structural Control of High Rise Building Using a Tuned Mass with Integral Hermetically Sealed, Frictionless Hydraulic Dampers*** - *Alan Klembczyk, Taylor Devices, Inc., Brian Breukelman and Rowan Williams Davies & Irwin Inc.*

8:40 ***Dynamic Behavior of Reinforced-Concrete Columns with Growing Damage Under Earthquake Ground Motion*** - *Sunwoo Park, W.P. Yen, J.D. O'Fallon, and J.D. Cooper, Federal Highway Administration/PSI*

9:00 ***Rheological Modeling of Viscoelastic Dampers for Structural and Vibration Control*** - *Sunwoo Park and W.P. Yen, Federal Highway Administration, PSI*

9:20 ***Fluid Lock-up Devices - A Robust Means to Control Multiple Mass Structural Systems*** - *Douglas Taylor, Taylor Devices, Inc.*

9:40 ***Structure Vibration Using Land Air Gun Impactor*** - *Ali Niousha, Masato Motosaka, Tohoku University*

Data Acquisition Discussion Group — *10:20-11:20* — *Regency B* — *Chair: Strether Smith, DSPCon*

The Data Aquisition Discussion Group will meet to discuss successes and horror stories from the digital data acquistion and experimental data analysis world. First, the data acquisition vendors represented at the symposium will be invited to make short presentations describing advances in their products. Then there will be a general discussion soliciting war stories from the participants. Primary emphasis will be placed on the pros and cons of the various technologies and practices available for structural-dynamic testing.

Track Three

Blast	*Washington Room*	*Chair: Michael Hale, Redstone Technical Test Center* *Co-Chair: Charlie Joachim, ERDC*

8:00 ***Smart Target Model Generator*** *- Russell Dukes and David Watts, AFRL, and Diane Verner, Applied Research Associates*

8:20 ***Finite Element Computation of the Mighty North Event*** *- David Steedman and Robert Swift, Los Alamos National Laboratory*

8:40 ***Hybrid Discrete Element/Smooth Particle Hydrodynamic Modeling of the Mighty North Event*** *- Robert Swift, David Steedman, and Ted Carney, Los Alamos National Laboratory*

9:00 ***Impact Dynamics on Composite Material*** *- Photios Papados, US Army Engineer Research Laboratory and Development Center*

9:40 ***DYNA3D Steel Frame Response Comparisons to HE Testing*** *- James Wesevich, Wilfred Baker Engineering, and Glenn Roberts, El Dorado Engineering*

10:00 ***Description of the Steam Explosion Models of Two Complementary Computer Codes*** *- Marie-France Robbe, CEA Saclay, Pierre Sardain, CEA Cadarche, and Jean-Rene Jevais, ISPN*

10:20 ***Influence of a Shock Absorber Presence in the Simulation of an Explosion*** *- Marie-France Robbe, CEA Saclay*

10:40 ***Comparison of Different Simplified Accident Scenarios to Simulate a Vapor Explosion in a Tank*** *- Marie-France Robbe, CEA Saclay and Pierre Sardain, CEA Cardarche*

11:00 ***Modeling and Analysis of a 3-D Asymmetric Mine-Soil Structure Interaction Problem with Mine Buried in Dry Sand*** *- Aaron Gupta, US Army Research Laboratory*

Track Four

Gun Launch Environments	*Potomac V*	*Chair: Ami Frydman, Army Research Lab*

8:00 ***Scalability of the Slingatron Mass Launcher*** *- Gene Cooper, Stephen Wilkerson, US Army Engineering Research and Development Center*

8:20 ***Developing a Transient Finite Element Model to Simulate the Launch Environment of the 155mm SADARM Projectile*** *- Stephen Wilkerson, US Army Research Laboratory*

8:40 ***Consideration for Modeling Gun Launched Structures Using the DYNA3D Hydrocode*** *- Stephen Wilkerson, US Army Research Laboratory*

9:00 ***Artillery Gun Launch Modeling of the SADARM Electronic Module Assembly*** *- Morris Berman, David Hopkins, Stephen Wilkerson, and Abraham Frydman, US Army Research Laboratory*

Track Five

UNDEX (Classified)	*NSWC/Carderock*	*Chair: Mark Hoffman, NSWC/Carderock* *Co-Chair: Jay Minicucci, Electric Boat Corp.*

8:00 ***Comparison of Shock Factors Calculated from Similitude Equations and Shock Trials*** *- Warren Reid, Defense Science and Technology Organization and Frederick Costanzo, NSWC/Carderock*

8:20 ***Analysis of the Shock Response of a CVN Type Surface Ship*** *- Kevin Arden, Newport News Shipbuilding*

8:40 ***Correlation of USA Results to the SMTV Test Fore/Aft Direction*** *- Kevin Arden, Newport News Shipbuilding*

9:00 ***Analytical Simulation of the LPD-1 Live Fire Tests*** *- George Camp, Bath Iron Works*

9:20 ***Evaluation of Surf Zone Obstacle Damage for Multiple Charge Arrays*** *- Paul Gefken, SRI International, Kathy Ruben, Advanced Technology Research, Donald Robeson, NSWC/CSS, and Windsor Furr, NSWC/Indian Head*

9:40 ***Application of Charge Standoff Envelope Concept to Underwater Explosion Shock Qualification Tests of Submarine Hull Equipment*** *- Roy Javier, Naval Surface Warfare Center/Carderock Division and Vernon Bloodgood, Engineering Technology Center*

Advanced Material System Bow Dome Shock Evaluation (Classified)	*NSWC/ Carderock*	*Chair: Erik Rasmussen, NSWC/Carderock*

10:40 ***AMS Bow Dome Shock Evaluation - Rational, Test Design, and Results*** *- Erik Rasmussen, NSWC/Carderock*

11:00 ***Advanced Material System Composite Bow Dome Shock Environment*** *- Dawn Barrasso, Electric Boat Corp.*

11:20 ***Correlation of Measured and Computed UNDEX and Shock Response of the AMS Bow Dome Shock Test Configuration*** *- Douglas Lesar, NSWC/Carderock*

Thursday Afternoon, November 9, 2000

NSWC/Carderock Tour, Buses leave at 12:15 from Hotel

Track One

Test Methods	*Regency A*	*Chair: Jeff Blankenship, NSWC/CCS* *Co-Chair: James Johnson, ERDC*

1:00 ***A Force Measuring Device for Barge-Impact Experiments*** *- Vincent Chiarito, U.S. Army Engineer Research and Development Center*

1:20 ***Balanced Constant Current Excitation for Dynamic Strain Measurements*** *- Douglas Firth and Alan Szary, Precision Filters, Inc.*

1:40 ***Results of the HESSI Test Mishap Investigation*** *- Daniel Worth, NASA Goddard Space Flight Center, and Rodney Phillips, NASA Marshall Space Flight Center*

2:00 ***Floating Shock Platform Characterization Study*** *- Robert Handleton, NSWC/Carderock*

2:20 ***Lightweight Shock Machine Calibration Using Modern Instrumentation*** *- Eric Luft, NSWC/Carderock*

2:40 ***Return to the Flight of the Delta III*** *- Robert Bridges, Wyle Laboratories*

Track Two

Isolation II	*Regency B*	*Chair: Jim Dimitri, Electric Boat Corporation* *Co-Chair: Fred Costanzo, NSWC/Carderock*

1:00 ***Underwater Explosions Tests of LPD-17 SSES Compartment: Assist Program 3 Kip, Enidine, Herm, and NNS Industrial C-Worthy Mounts*** *- Rhonda Ingler, Curtis Annibale, Michael Campbell, Frederick Constanzo, Eric Luft, John Przybysz, Richard Sasse, and Douglas Lesar, Naval Surface Warfare Center/Carderock Division*

1:20 ***Analysis of Isolated Raft Systems Using a 2DOF Nonlinear Spring-Mass System*** *- Curtis Annibale and Frederick Constanzo, Naval Surface Warfare Center/Carderock Division*

1:40 ***Elastomeric Encased Wire Rope Isolator (HERM) Mount*** *- Mike Latvis, Kaya Kosar, and Ken Tomita, Enidine Incorporated*

2:00 ***Elastomeric Shock Absorbing Missile Canister Isolator (SKID)*** *- Kaya Kosar and Mike Latvis, Enidine Incorporated*

Track Three

UNDEX I	*Washington Room*	*Chair: Rick Griffen, Newport News Shipbuilding*

1:00 ***Two-Phase CFD Simulation of the collapse of Underwater Explosion Bubble Under a Circular Plate*** *- Kit-Keung Kan, Philemon Chan, and James Stuhmiller, Jaycor*

1:20 ***A Computational Study of Bubble-Structure Interaction*** *- Philemon Chan, Kit-Keung Kan, and James Stuhmiller, Jaycor*

1:40 ***An Application of the Multivariate Data Reduction Technique to a Floating Shock Platform Test*** *- Whitney Roberts and Eric Luft, NSWC/Carderock*

2:00 ***Numerical Simulation of Cavitation*** *- Zhi Zong and Khin Yong Lam, Institute of High Performance Computing*

UNDEX I I	*Washington Room*	*Chair: John Plisinski, Electric Boat Corp.*

Sensitivity Analysis of Coupled Fluid Volume to Ship Shock Simulation *- Philip Malone and Young Shin, Naval*

3:00 *Postgraduate School*

Development of CVN76 Whole Ship Finite Element Model *- Robbie Bice, Newport News Shipbuilding*

3:20 ***Comparisons of UNDEX Shock Using UK, US Navy Standard & Commercial Tourmaline Pressure Gages*** *- Ronald*

3:40 *Tussing and K.W. Rye, NSWC/Carderock*

Track Five

Hydrocode Simulation	*NSWC/Carderock*	*Chair: Greg Harris, NSWC/Indian Head*

1:00 ***Overview of Navy Hydrocode Development Efforts at NSWC*** *- Greg Harris, NSWC/Indian Head*

1:20 ***Validation of the Non-Ideal Explosive Equation of State Model*** *- Reid McKeown, NSWC/Indian Head*

1:40 ***Calculation of Bubble Pulse Loading on a Nearby Cylindrical Structure*** *- Andrew Wardlaw, NSWC/Indian Head*

2:00 ***Response of a Hemispherical Dome to Combined Shock and Bubble Jet Loading*** *- Daniel Tam, NSWC/Indian Head*

2:20 ***Close-in UNDEX Response Simulations Using Fully Coupled Hydrocodes*** *- Stephen Poy, NSWC/Carderock*

2:40 ***DYSMAS Simulation of Hydrobulge Hull Rupture Experiments*** *- John McKirgan, NSWC/Carderock*

3:00 ***Advanced Amphibious Assault Vehicle Shock Analysis*** *- Paul Mantz, NSWC/Carderock*